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Skull Base Invasion In Extensive Cholesteatoma: Our Experience In Tertiary Care Hospital

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Abstract

Background: Cholesteatoma, being a benign lesion, can extend to cause bone erosion and may lead to complications depending upon the involved area. The surgical difficulties faced during removal of the disease is a challenge to the new surgeons and also, to experienced ones. The involvement of the disease around Internal carotid artery, Jugular bulb and Facial nerve makes it more complicated and needs intricate and tedious removal of the disease.

Objectives:

1) To document the clinical features, complications, surgical management, post-operative outcome of extensive cholesteatoma in our tertiary centre

2) To document the involvement of three critical structures- Jugular bulb, Facial nerve, Internal carotid artery in extensive cholesteatoma.

Methods: 12 patients were included in the study diagnosed with Chronic otitis media with Extensive cholesteatoma, involving either of the 3 structures were considered. Pre-operatively, clinical features,presenting complications, radiological findings and audiological assessment was done. Intra-operatively, involvement of the structure was noted and post-operative treatment was noted.

Results: 6 patients (50%) presented with involvement of Facial nerve, 4 patients(33.4%) presented with involvement of Jugular bulb and 2 patients(16.6%) presented with involvement of Internal carotid artery.

Conclusion: The extent of the disease would give us an idea of the surgical challenges which we would encounter and can help in the better planning of the surgery

Keywords: Extensive cholesteatoma, skull base, facial nerve palsy, dehiscent internal carotid artery, high jugular bulb

Introduction

Cholesteatoma is a benign lesion of the middle ear consisting of desquamated keratinizing epithelium, giving rise to further extension and thereby causing bone erosion and involvement of the surrounding structures. A late stage diagnosis is more common since they grow to a remarkable size and make their presence felt clinically and progress to advanced stage, causing involvement of the critical structures and lead to intracranial complications.

Cholesteatoma may have complications related to the disease state and location which could vary from fistula formation of the lateral semicircular canal, facial palsy, total sensorineural loss, sinus thrombosis and further by, progress to intracranial invasion causing temporal lobe abscess, petrositis, pyogenic meningitis, cerebellar abscess [1,2].

The three important critical structures we wish to highlight are the Jugular Bulb, Facial Nerve, and Internal Carotid artery. The involvement of these

structures as well as preservation of hearing wherever feasible make the case meticulous and often a surgical challenge which requires expertise.

The clinical presentation of this disease could be purulent discharge, otalgia, hearing loss, temporal headache, fever, vertigo, altered sensorium, acute onset facial palsy. Other symptoms when there is intracranial involvement would be depending on the location of the abcess, like pyogenic meningitis showing headache, high grade fever with focal neurological deficit and meningeal signs positive sometime, or cerebellar abscess presenting with dizziness, vomiting, ataxia, nystagmus, or sometimes temporal lobe lesions presenting with seizures [3,4].

After a thorough ENT examination, where otoscopic examination could reveal an intact tympanic membrane or attic retraction with or without necrosis of ossicles, a CT scan is useful to evaluate the extent of the disease, any bone erosion and the involvement of surrounding structures, which is beneficial as it gives the layout of how to go about with the surgery.

However, these cases are meticulous and often a surgical challenge which required expertise. In this study, we aim at retrospectively reviewing the clinical features, complications, involvement of 3 critical structures – jugular bulb, facial nerve or internal carotid artery, surgical management with regards to the involved structures and post-operative outcomes of extensive cholesteatoma .

Materials And Methods

A retrospective review of patients diagnosed with Cholesteatoma based on their clinical presentsation and radiological extent presenting in our centre from the year January 2017 to July 2019 were taken. The study was conducted after the approval of the Ethical clearance in our institute.12 patients who fulfilled the inclusion criteria were included in the study. The mean of clinical presentations seen in all the 12 patients, along with radiological investigation, diagnosis, surgical management is noted.

The objective of the study is:

1) To document the clinical features, complications, surgical management, post-operative outcome of extensive cholesteatoma in our tertiary centre

2) To document the involvement of three critical structures- Jugular bulb, Facial nerve, Internal carotid artery in extensive cholesteatoma.

Inclusion criteria of the study is: a) Chronic Otitis media with extensive cholesteatoma with invasion of any one of the structures: Facial nerve, Jugular bulb, Internal carotid artery.

The context of the study is based on their clinical presentation, investigations, diagnosis, surgical management, intraoperative findings. Patient's clinical presentation is noted and radiological CT scan is done to confirm the diagnosis. Once a diagnosis is made, considering the extent of the disease based on radiological investigation, plan of surgery is taken. All patients underwent Canal wall down mastoidectomy +/- Ossiculoplasty. 3 of them out of the 12 underwent Subtotal petrosectomy. Intra-operative finding of the extent of the disease is noted and the involvement of the 3 structures are tabulated accordingly. The granulation tissue encircling the structure involved was meticulously removed by one experienced surgeon.

Pre and post operative audiological assessment was performed using Pure tone audiometry. Facial nerve grading in patients with facial palsy was carried out pre and post operatively, using House-Brackmann grading. Post-operative complications were noted and were conservatively managed. All patients were treated with intravenous antibiotics and intravenous steroids if required.

All patients were followed up for a period of 6 months. All patients improvement during the post operative follow up visits were noted and patients with facial nerve palsy underwent facial physiotherapy, and were continued to be assessed according to House Brackmann grading. Any episode of recurrence was noted.

Results:

In this study of 12 patients involving Extensive Cholesteatoma, the presenting age of the disease varied from youngest patient being 10 years old and the eldest being 52. Among the 12,the presenting feature of these patients are mentioned in Table. The common factor among all, is foul smelling purulent ear discharge, for an average duration of 4 years. The other presenting symptoms as mentioned in table 1 and graph 1, were otalgia seen in 9/12(75%). 10/12

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patients(83.33%) presented with hard of hearing. Facial palsy was seen in 6/12 patients(50%), and 2 patients showed nystagmus on clinical examination, which was seen in the 2 cases of Cerebellar abscess. On otoscopic examination,all patients had attic retraction. In 5(41.66%) patients, granulation tissue was visualised on otomicroscopy. 1 patient had Rhombergs sign positive in whom there was cerebellar abscess. PTA at the time of presentation showed an average of 55dB hearing loss. 2(16.66%) patients had associated sensorineural hearing loss with extensive cholesteatoma. CT scan findings were noted for any anatomical variation and the extent of the disease, which noted tegmen erosion in 8/12(66.66%) patients. Also, high Jugular bulb was noted in 4/12(25%) with involvement of the disease, and 3(25%) patients,the disease was invading the sigmoid sinus

All patients underwent a canal wall-down mastoidectomy as a definitive procedure. Mastoid tip, retrofacial recess and posterior cavity were obliterated using fat and post auricular soft tissue which was lengthened. In two cases of EC invading the external auditory canal,blind sac closure was done. In one case of extensive cholesteatoma in cochlea,while drilling the cochlea CSF otorrhea was noticed and blind sac closure was done. Altogether in 3(25%) cases of extensive cholesteatoma, blind sac closure was performed. In 2 patients who developed cerebellar abscess ,drainage procedure was performed by a Neurosurgeon.The mastoid cavity exploration in this case was done and cleared off from cholesteatoma in the same sitting. In 7(58.33%) patients of extensive cholesteatoma, ossciculoplasty was done following canal wall down mastoidectomy. Myringostapediopexy was done in 2 patients and myringoplatinopexy was done in 5 patients.In the remaining 2 cases,canal wall down mastoidectomy was performed without ossiculoplasty as they had associated sensorineural hearing loss.

Intra operative findings were noted in terms of involvement of the critical structures. We noted the involvement of disease involving facial nerve to be in 6/12 patients, and these cases were handled by gently pulling the nerve and looping the gel foam around to give minimal pressure in removing the cholesteatoma. These 6 patients had presented with pre-operative facial nerve palsy, out of which, 4 presented with facial nerve palsy of House Brackmann Grade 2 and 2 presented with House Brackmann Grade 2 [5]. Post surgery, all patients continued with the same grade except one patient which increased to House Brackmann Grade 3. Post surgery,these patients were conservatively managed with systemic steroids and Facial physiotherapy and within 3 months, facial nerve palsy was cured.

Graph 2 represents a pie chart of the distribution of involvement of the three critical structures. Patients with high jugular bulb with involvement of disease were countered by gently pushing the jugular bulb posteriorly to create some space to clear the EC. There was continuous irrigation while doing Cortical mastoidectomy and the drilling was done with utmost caution.

In patients with Dehiscent Internal Carotid artery, the pulsatile artery was not disturbed and the extensive cholesteatoma was removed cautiously without damaging the artery and leaving any residue. The gel foam was then placed to maintain hemostasis. A temporalis fascia graft was placed over the Pulsatile artery and gel foam was further placed securing the position.

2(16.66%) patients developed sigmoid sinus thrombosis, 2(16.66%) patients presented with cerebellar abscess and 1(8.33%) patient had petrositis[6,7]. Decompression of the sigmoid sinus was done ,but no anticoagulation therapy was used for patients with sigmoid sinus thrombosis.These patients were closely monitored.Patients with features of Gradenigo's syndrome(petrositis) were treated with intravenous antibiotics and recovered.

Figures 1 and 2 depict the CT, Figures 3, 4 and 5 depicts the intra-operative images of patients with extensive cholesteatomas.

TABLE 1: CLINICAL PRESENTATION OF OTITIS MEDIA

CLINICAL PRESENTATION	NO OF PATIENTS	PERCENTAGE

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Otorrhea	12	100%
Otalgia	9	75%
Decreased hearing	10	83.33%
Temporal headache	4	33.33%
Fever	3	25%
Vertigo	7	58.33%
Facial nerve palsy	6	50%
Nystagmus	2	16.66%

GRAPH 1: DISTRIBUTION OF SUBJECTS ACCORDING TO CLINICAL PRESENTATION

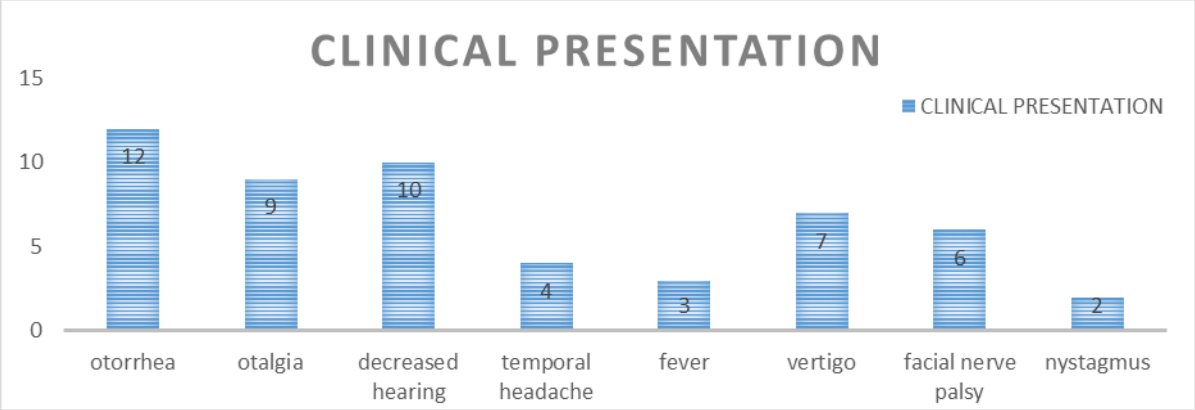

TABLE 2: INTRACRANIAL COMPLICATIONS

INTRACRANIAL COMPLICATIONS	NO. OF PATIENTS
Sigmoid sinus thrombosis	2
Cerebellar abscess	2
Petrositis	1

GRAPH 2: EXTENSIVE CHOLESTEATOMA INVOLVING THE CRITICAL STRUCTURES

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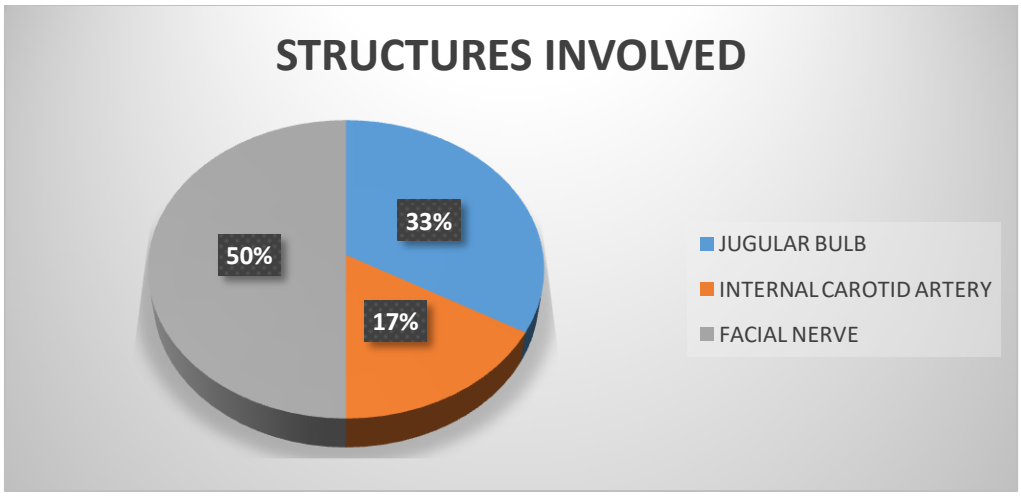

FIG 1: TEGMEN EROSION ON LEFT SIDE

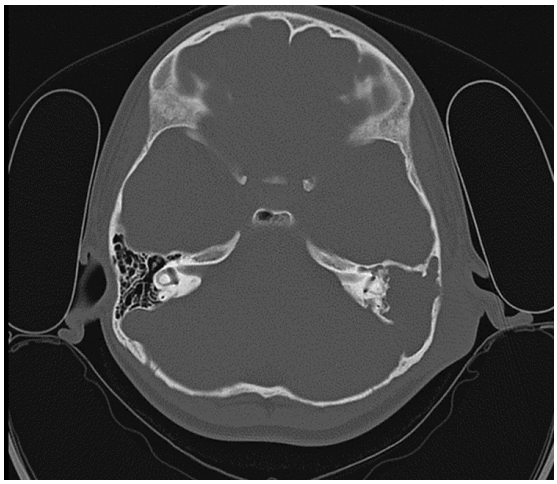

FIG 2: CEREBELLAR ABSCESS WITH TEGMEN EROSION

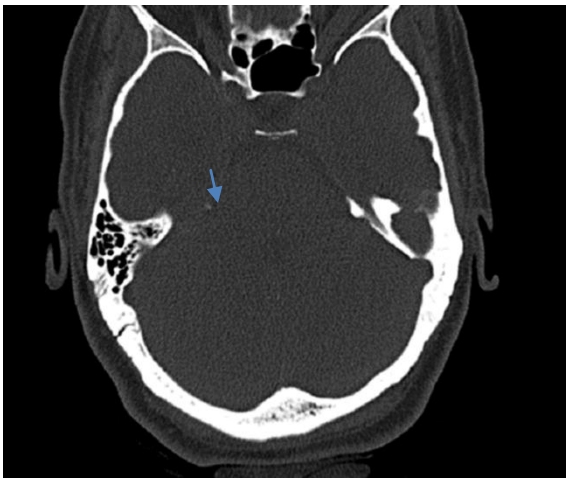

FIG 3: EXTENSIVE CHOLESTEATOMA WITH CEREBELLAR ABSCESS

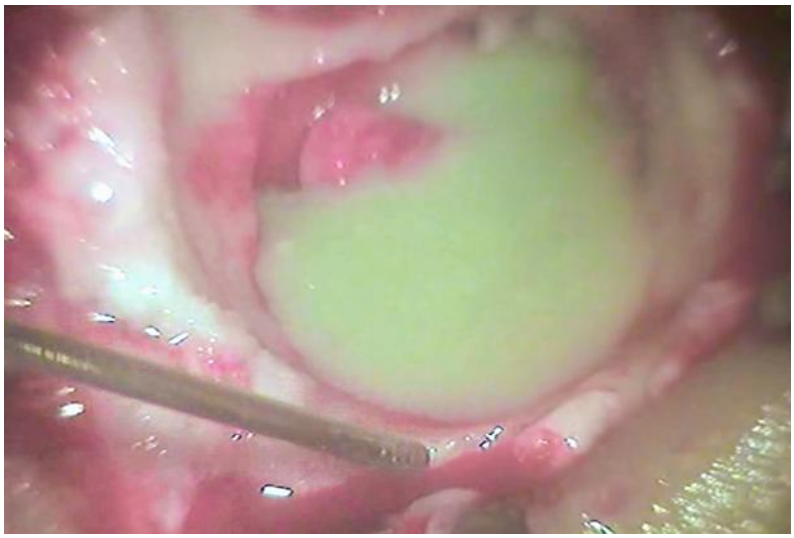

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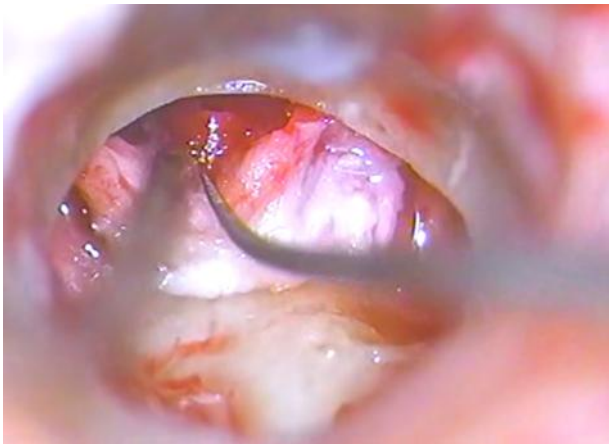
FIG 4: Fig 4: Extensive cholesteatoma involving Internal Carotid artery



Discussion:

Throughout the years, there has been an extensive amount of documentation stating that Extensive cholesteatoma is one of the most frequent pathology responsible for intracranial complications of otitis media. There is certain loss of bony barriers caused by the disease as the most common pathway for intracranial extension[6,7]. The more extensive is the disease, the more a surgical challenge. A definitive Canal wall down Mastoidectomy, which has to be performed the earliest, is the dictum.

To tackle the progressed disease presenting with Cerebellar abscess, a drainage procedure was advocated either through burr hole craniotomies or thgrough transmastoid route. Hafidh et al. [8] performed mastoidectomy either before, during or 3–10 days following intracranial abscess drainage, depending on maturation of brain abscesses. As it is said that most of the intracranial abscesses have an infective tract in continuity with the mastoid cavity, the selection of what route to be employed depends on the individual and institutional surgical protocols. But addressing both the intracranial abscess drainage along with mastoid exploration in the same sitting is advisable which was followed in our study .

In our study, 8/12 patients had significant erosion of the tegmen plate on CT scan. Six patients showed erosion of the tympanic or mastoid fallopian canal, as evidenced on CT and intraoperatively. Bony erosions in CT is characterized by the presence of scalloped margins. The bone eroding process first exposes the soft tissue of neighbouring structures. Protective granulations formed is the last line of defence. The pus under tension finally penetrates the wall of protective granulations by pressure necrosis. A prodromal period of partial or intermittent involvement of the structure frequently precedes the diffuse involvement.Thus, a milder,intermittent facial weakness may precede complete facial paralysis;recurrent mild vertigo may precede diffuse purulent labyrinthitis, and localized meningismus may precede diffuse purulent meningitis.

6(50%) patients presented with pre-operative facial nerve palsy. In these cases,EC was encircling the facial nerve and the granulation tissue was removed meticulously. Post operatively ,on intravenous administration of steroids and Physiotherapy,weakness subsided in 3-4 months duration. Greenberg and Manolidis [9] described extensive facial nerve involvement by cholesteatoma as adherence of matrix to at least 10 mm of epineurium involving half or more of its circumference. The direct inflammatory involvement of the facial nerve through fallopian canal dehiscence and compression result in edema. Some believe that the cholesteatoma itself could cause facial paralysis through neurotoxic substances that it might secrete and or cause bony destruction via various enzymatic activities [10].

The requirements for a pathologic diagnosis of cholesteatoma include a combination of squamous epithelium, granulation tissue and keratinaceous debris. In all the 12 patients, the tissue histopathology showed cholesteatoma

Conclusion:

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It is an era of antibiotic which has led to significant decrease in the number of intracranial complications of this disease, with the incidence being more in the developing countries than the developed ones. Adding to this, is the lower socioeconomic strata of these patients.

Involvement of Facial nerve, Internal Carotid artery and Jugular bulb makes it a tedious surgery and leads to intracranial complications with significant morbidity and mortality. Methodical evaluation, hand in hand with timely surgery, will benefit the outcome of the disease.

References:

1. Bartels LJ (1991) Facial nerve and medially invasive petrous bone cholesteatomas. Ann Otol Rhinol Laryngol 100:308–316
2. Grayeli AB, Mosnier I, El Garem H, Bouccara D, Sterkers O (2000) Extensive intratemporal cholesteatoma: surgical strategy. Am J Otol 21:774–781
3. Penido Nde O, Borin A, Iha LC, Suguri VM, Onishi E, Fukuda Y,Cruz OL (2005) Intracranial complications of otitis media: 15 years of experience in 33 patients. Otolaryngol Head Neck Surg 132:37–42
4. Hafidh MA, Keogh I, Walsh RM, Walsh M, Rawluk D (2006) Otogenic intracranial complications. A 7-year retrospective review. Am J Otolaryngol 27:390–395
5. House JW, Brackmann DE (1989) Facial nerve grading system.Otolaryngol Head Neck Surg 93:146–147
6. Penido Nde O, Borin A, Iha LC, Suguri VM, Onishi E, Fukuda Y,Cruz OL (2005) Intracranial complications of otitis media:15 years of experience in 33 patients. Otolaryngol Head Neck Surg 132:37–42
7. Ropposch T, Nemetz U, Braun EM, Lackner A, Tomazic PV,Walch C (2011) Management of otogenic sigmoid sinus thrombosis. Otol Neurotol 32:1120–1123
8. Hafidh MA, Keogh I, Walsh RM, Walsh M, Rawluk D (2006) Otogenic intracranial complications. A 7-year retrospective review. Am J Otolaryngol 27:390–395
9. Greenberg JS, Manolidis S (2001) High incidence of complications encountered in chronic otitis media surgery in a U.S. metropolitan public hospital. Otolaryngol Head Neck Surg 125:623–627
10. Chu FW, Jackler RK. Anterior epitympanic cholesteatoma with facial paralysis: a characteristic growth pattern. Laryngoscope. 1988 Mar;98(3):274–279

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